## AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

### Listing of Claims

Claims 1 – 15 (Cancelled)

Claim 16. (Currently Amended): A method of measuring temperature in a furnace comprising:

providing a combustion gas stream containing water vapor and carbon dioxide, wherein the combustion gas stream is semi transparent to wavelengths of infrared radiation,

positioning a pyrometer having a lens tube and an optical head comprising a single objective lens in a fireside port of the furnace, with a line of sight intersecting a passage of the combustion gas in the furnace and able to view at least forty feet of unobstructed interior of the furnace from one furnace wall short of an opposite furnace wall ~~containing a plurality of gas components~~;

providing a photometer circuit connected to the optical head for detecting wavelengths of infrared radiation produced by water vapor contained in the combustion gas stream ~~receiving infrared radiation from the gas~~ as it passes the line of sight;

measuring the infrared radiation produced by water vapor contained in the combustion gas stream through the single objective lens in the fireside port of the furnace.

converting the infrared radiation ~~in the optical head~~ to a electrical signals;

~~providing a photometer circuit connected to the optical head for processing~~ the

~~electrical signals;~~

providing the lens tube with a cooling means comprising a inner concentric tube and a outer concentric tube; wherein the cooling means is capable of aspirating the objective lens;

utilizing a cooling gas to cool the lens tube;

providing a watertight electronics enclosure mounted to the lens tube for housing electronic circuitry;

providing a power supply circuit;

providing a scaling circuit mounted within the electronics enclosure and connected to the photometer circuit for scaling the electrical signals;

scaling the electrical signals to maximize signals generated by infrared radiation which is semi-transparent to the combustion gas stream ~~components~~;

providing an output circuit connected to the scaling circuit for receiving a ~~electrical~~ 0 to 2 milliamp analog output signals and producing an output voltage signals; and

providing an output means connected to the output circuit for displaying the output voltage signal as a temperature measurement;

providing the watertight electronics enclosure with an analog thermometer;

measuring the temperature in watertight electronics enclosure with the thermometer;

and utilizing a cooling means comprising a vortex cooler and coolant to maintain a temperature of below 130 F in the watertight electronic enclosure.

Claim 17. (Original): A method according to claim 16 including scaling the electrical signals for infrared radiation in a wavelength range of about 1.3 to about 3.1 microns.

Claim 18. (Currently Amended): A method according to claim 17 including scaling the signals for infrared wavelengths of about 1.38 microns for sensing the temperature of $H_2O$ ~~as~~ in the combustion gas stream ~~component~~.

Claim 19. (Original): A method according to claim 16 including scaling the electrical signals for wavelengths between 1.8 and 3.1 for measuring the temperature of mixtures of $H_2O$, $CO_2$ or mixtures thereof.

Claim 20. (New): A method according to claim 16, wherein the line of sight is a conical shape expanding between about 3 and about 8 degrees along the axis of the line of sight.

Claim 21. (New): A method according to claim 20, including the step of taking a temperature reading between about 1 and about 100 feet from the optical head within the conical shape.

Claim 22. (New): A method according to claim 21, wherein the temperature reading is taken between about 30 and 60 feet from the optical head.

Claim 23. (New): A method according to claim 16, wherein the power supplies comprises a logic supply, an analog supply, and an analog output supply.

Claims 24. (New) : A method according to claim 16, wherein scaling the electric signal comprises the steps of receiving an analog signal from the photometer circuit, digitizing the analog signal to a digital input in the analog/digital converter, sending the digital input to the programmable read only memory, analyzing the digital input in the programmable read only memory, converting the digital input to a 8 bit parallel digital output in the programmable read only memory, and converting the 8 bit parallel digital output to the 0 to 2 milliamp analog output signal in the digital/analog converter.